

measure at least one characteristic of the telephonic voice connection. A processor is coupled to the measurement circuit. The processor is operative to calculate a solution to at least one empirically derived mathematical function by using the at least one measured characteristic as an independent variable in the at least one empirically derived mathematical function. The solution is an estimate of likely user perception of the quality of the telephonic voice connection.

Claim 18 is directed to a method for evaluating quality in a telephonic voice connection in a telecommunications network. The method includes establishing a telephonic voice connection. At least one characteristic of the telephonic voice connection is measured. A solution to at least one empirically derived mathematical function is calculated by using the at least one measured characteristic as an independent variable in the at least one empirically derived mathematical function. The solution is an estimate of likely user perception of the quality of the telephonic voice connection.

Claim 29 is directed to a programmable device for evaluating quality in a telephonic voice connection in a telecommunications network. The device includes a memory operative to store at least one empirically derived mathematical function having at least one independent variable. A processor is coupled to the memory. The processor is operative to calculate a solution to the at least one empirically derived mathematical function by using at least one measured characteristic as the independent variable. The solution is an estimate of likely user perception of the quality of the telephonic voice connection. An interface control circuit is coupled to the memory. The interface control circuit is adapted to receive a revised at least one empirically derived mathematical function from an external device, and store the revised at least one empirically derived mathematical function in the memory.

Claim 37 is directed to a method for fabricating a device for evaluating quality in a telephonic voice connection in a telecommunications network. The method includes empirically acquiring user perception data by having at least one test subject listen to a plurality of test messages, and rate the quality of each test message in accordance with at least one user perceived impairment characteristic. The user perception data is modeled as at least one mathematical function. The at least one mathematical function is graphically represented by a two dimensional curve having a shape. The shape of the curve is determined by a set of constants employed in the at least one mathematical function. Values are chosen for the set of constants to thereby fit the two-dimensional curve to the user perception data to thereby generate at least one empirically derived mathematical function. The at least one empirically

derived mathematical function is converted into a set of computer executable instructions. The device is programmed with the set of computer executable instructions.

Claim 49 is directed to a computer readable medium having computer executable instructions for performing a method. The method includes establishing a telephonic voice connection. At least one characteristic of the telephonic voice connection is measured. A solution is calculated for the at least one empirically derived mathematical function by using at least one measured characteristic as an independent variable of the at least one empirically derived mathematical function.

Claim 61 is directed to a programmable device for evaluating quality in a telephonic voice connection in a telecommunications network. The device includes a memory operative to store at least one empirically derived mathematical function having at least one independent variable. An interface control circuit coupled to the memory. The interface control circuit is adapted to receive revised empirically derived data from an external device, and store the revised empirically derived data in the memory. A processor is coupled to the memory. The processor is programmed to calculate a revised empirically derived mathematical function using the revised empirically derived data. The processor calculates a solution to the revised at least one empirically derived mathematical function by using at least one measured characteristic as the independent variable. The solution is an estimate of likely user perception of the quality of the telephonic voice connection.

Hollier discloses a system for testing telecommunications equipment. The system includes connecting a first quality analysis device and a second quality analysis device to the telecommunications network under test. The first device and second device converse using artificial speech signals. The devices perform measurements on the sounds received from the other device. The device processes the received speech using a conversational processor and a perceptual analysis unit (See Figure 2, and column 9, lines 10-23, and lines 38-49). The perceptual analysis unit compares received speech with expected speech to analyze the quality of the received speech. The processor is coupled to the analysis unit and uses analysis unit inputs to control conversational intent and recovery behavior to the received speech (See column 9, lines 17-22). Neither the perceptual analysis unit nor the conversational processor calculate a solution to at least one empirically derived mathematical function to provide an estimate of likely user perception of the quality of the telephonic voice connection.

Malvar discloses a codec that is used to encode and decode digital signals for use in CDs, Internet audio, DVDs, and telephony. During transmission, the system includes an A/D

converter that converts an analog audio signal into a digital representation of the audio signal, and a codec, which encodes and compresses the digital signal. The system also includes a decoder and D/A converter that performs the reverse process during reception of an encoded signal.

The coder includes an MLT transform processor, a weighting processor, a uniform quantizer, a spectrum processor, and entropy encoder, and a multiplexer (See column 3, line 21-35). The MLT transform processor receives an original signal and produces transform coefficients (See column 9, line 13- column 13, line 22). The quantizer and the weighting processor perform spectral weighting and partial whitening in order to mask quantization noise (See column 13, line 23 – column 15, line 54). The entropy encoder uses a probability model to measure the amount of information contained in a message and to perform variable-to-fixed length block encoding. The entropy encoder includes a run-length encoder and a Tunstall encoder. The run-length encoder reduces the symbol rate for sequences of zeroes by mapping variable length strings into source code words of a given length using a statistical model. The Tunstall encoder compresses the source code words (See column 15, line 55 to column 18, line 49). The statistical modeling used to perform entropy encoding uses a modified Laplacian-exponential probability density function (PDF) for the run-length encoding (See 18, line 50 - column 19, line 62). The PDF model is controlled by the parameter A (See column 19, line 38-39). The parameter A is the maximum value of a fixed block (See column 18, lines 23- 49).

According to the **MPEP 2143**, three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

A. The prior art references do not teach or suggest all the claim limitations.

Claim 1:

In paragraph 1 of the Office Action, the Examiner states that Hollier teaches a system and method for evaluating quality in a telephonic voice connection. He also states that Hollier's system includes a measuring circuit and a processor, as recited in claim 1. In making his rejection, the Examiner relies on the Title, Abstract, col. 1, line 8 - column 4, line 67, column 5, line 12 - column 6, line 67, and column 7, line 25-column 16, line 34. The Examiner does not point out where in these massive blocks of text the individual elements can be found.

In the Background of the Invention (Columns 1-2), Hollier describes the development of various techniques used to characterize the quality of a network. Hollier states that there are essentially two ways to determine network quality. First, an objective analysis may be employed. Examples of objective analyses include signal-to-noise measurements. Hollier dismisses the use of objective methods, because they neglect user perception, or because they use signals (such as sine waves) not normally transmitted over the network (See column 1, line 37- 50, and column 2, lines 7-15). The second method involves subjective analyses.

Hollier describes a mean opinion score (MOS) method, a conversational assessment method, and artificially generated speech method. However, the MOS method is a static analysis that uses post-processing techniques. As explained by Hollier, the MOS is derived by subjects rating the quality using a five point scale ranging from "excellent" to "bad." Thus, the MOS as described in Hollier does not use an empirically derived mathematical function, as recited in claim 1 (See column 1, line 17-29, and column 1, line 50 - column 2, line 29). The conversational assessment method, which varies vocal level until "equilibrium is achieved, also does not solve an empirically derived mathematical function to determine quality (See column 2, lines 30- 40). The artificially generated speech method uses precisely defined and easily reproducible phonemes. Received artificial speech is compared with stored speech (See column 2, lines 41- 48). This method also does not solve an empirically derived mathematical function to determine quality. Thus, the Background of Hollier's invention does not teach, suggest, or disclose the processor, as recited in claim 1.

Moving to the detailed description of the cited reference, Hollier discloses a system for testing telecommunications equipment to address the problems detailed in the Background of his Invention. The system includes connecting a first quality analysis device and a second quality analysis device to a telecommunications network. The first device and second device converse using speech signals. The receiving device include a conversational processor and a perceptual analysis unit programmed to react to the received speech (See Figure 2, and

column 9, lines 10-23, and lines 38-49). The perceptual analysis unit compares received speech with expected speech to analyze the quality of the received speech (Column 9, lines 38-41). In response, the processor updates and controls the conversational states to adapt conversational intent and recovery behavior to the received speech (Column 9, lines 41-44). A description of a conversational assessment of a two-device system is shown in Figures 3-6, and described at column 9, line 53 – column 12, line 54.

In light of the above, Hollier does not teach a processor operative to calculate a solution to at least one empirically derived mathematical function by using the at least one measured characteristic as an independent variable in the at least one empirically derived mathematical function, whereby the solution is an estimate of likely user perception of the quality of the telephonic voice connection, as recited in claim 1.

The Examiner states that Malvar provides the elements missing from Hollier. In particular, the Examiner states that Malvar teaches a system that uses “real-time parametric modeling for a probability distribution function that approximates the user perception of the quality of a voice connection.” The Applicant respectfully disagrees with the Examiner’s characterization of the Malvar reference.

First of all, Malvar is not directed to a system for evaluating quality in a telecommunications network. Malvar discloses a codec that performs entropy encoding (See Title, Abstract, column 1, lines 15-18, column 3, line 14 - column 4, line 11). Thus, any processing performed by the codec is not directed to evaluating system quality, it is instead, directed to encoding and decoding digital signals (See column 3, lines 14-20). As a matter of fact, Malvar never discusses evaluating network quality.

Second of all, Malvar does not employ either a probability distribution function, or a probability distribution function that approximates the user perception of the quality of a voice connection as the Examiner asserts. Malvar employs a modified Laplacian-exponential probability density function (PDF) for a run-length encoding step within the overall entropy encoding process (See 18, line 50- column 19, line 62). See the explanation in the paragraph below. Furthermore, the PDF model is controlled by the parameter A (See column 19, line 38-39). The parameter A is the maximum value of a fixed block (See column 18, lines 23-49). Thus, the parameter A is not a measured characteristic of a telephonic voice connection.

The claims depending from claim 1 are also allowable in their own right. For example, claim 2 recites that the at least one empirically derived mathematical function is a cumulative probability distribution function. Neither Hollier nor Malvar teach a cumulative

probability distribution function. As discussed above, Malvar uses a modified Laplacian-exponential probability density function (PDF). Those of ordinary skill in the art will recognize that a probability density function is not the same as a cumulative probability distribution function (CDF). Mathematically speaking, a PDF is the derivative of a CDF. See *Haykin, Simon S., Communications Systems*, 1983, by John Wiley & Sons, Inc., p. 234. With respect to claims 3-9, none the equations recited therein can be found in either Hollier or Malvar.

Claims 2-17 are also allowable by virtue of their dependency on claim 1. For the above stated reasons, the Applicant respectfully asserts that claims 1 - 17 are patentable under 35 U.S.C. § 103(a).

Claim 18:

The Applicant notes that the Examiner provides no independent analysis for claim 18. However, claim 18 is allowable for the same reasons claim 1 is allowable. Neither Hollier nor Malvar teach, disclose or suggest the step of calculating a solution to at least one empirically derived mathematical function by using the at least one measured characteristic as an independent variable in the at least one empirically derived mathematical function, whereby the solution is an estimate of likely user perception of the quality of the telephonic voice connection, as recited in claim 18. See the analysis provided above with respect to claim 1.

The claims depending from claim 18 are also allowable in their own right. For example, the subject matter of claims 19-22 cannot be found in either cited reference. Neither Hollier nor Malvar teach, disclose, or suggest an empirically derived first function, an empirically derived second function, or an empirically derived third function as recited therein.

Claims 19-28 are also allowable by virtue of their dependency on claim 18. For the above stated reasons, the Applicant respectfully asserts that claims 18 - 28 are patentable under 35 U.S.C. § 103(a).

Claim 29:

The Examiner also does not provide an independent analysis of claim 29. Claim 29 is directed to a programmable device for evaluating quality in a telephonic voice connection in a

telecommunications network. The Examiner does not point out where either Hollier or Malvar disclose a programmable device as recited in claim 29.

Claim 29 also includes a memory operative to store at least one empirically derived mathematical function having at least one independent variable. The Examiner does not point out where either Hollier or Malvar disclose the memory element recited in claim 29.

Claim 29 also includes a processor coupled to the memory. The processor is operative to calculate a solution to the at least one empirically derived mathematical function by using at least one measured characteristic as the independent variable. The solution is an estimate of likely user perception of the quality of the telephonic voice connection. In the analysis of claim 1, the Applicant has shown that neither Hollier nor Malvar include this element.

Claim 29 also includes an interface control circuit coupled to the memory. The interface control circuit is adapted to receive a revised empirically derived mathematical function from an external device, and store the revised empirically derived mathematical function in the memory. Neither Hollier nor Malvar disclose, teach, or suggest this element. The Examiner has failed to point out where this element can be found in either cited reference.

The claims depending from claim 29 are also allowable in their own right. For example, the subject matter of claims 31-34 cannot be found in either cited reference. Neither Hollier nor Malvar teach, disclose, or suggest any of the empirically derived functions, as recited therein.

Claims 30-36 are also allowable by virtue of their dependency on claim 29. For the above stated reasons, the Applicant respectfully asserts that claims 29-36 are patentable under 35 U.S.C. § 103(a).

Claim 37:

The Examiner does not provide an independent analysis of claim 37 either. Claim 37 is directed to a method for fabricating a device for evaluating quality in a telephonic voice connection in a telecommunications network. The Examiner does not point out where this method can be found in either Hollier or Malvar.

The method includes the step of empirically acquiring user perception data by having at least one test subject listen to a plurality of test messages, and rate the quality of each test message in accordance with at least one user perceived impairment characteristic. The user

perception data is modeled as at least one mathematical function. The Examiner does not point out where this step is found in either cited reference.

The at least one mathematical function is graphically represented by a two dimensional curve having a shape, the shape of the curve being determined by a set of constants employed in the at least one mathematical function. It is the Examiner's duty to point out where each claimed element is found in the cited references. The Examiner does not point out where this step is found in either cited reference.

The method also includes the step of choosing values for the set of constants to thereby fit the two-dimensional curve to the user perception data to thereby generate at least one empirically derived mathematical function. The Examiner has not pointed out where this step is found in either reference.

The method also includes the step of converting the at least one empirically derived mathematical function into a set of computer executable instructions. The step includes the limitation that the device is programmed with the set of computer executable instructions. The Examiner has not pointed out where this step is found in either reference.

The claims depending from claim 37 are also patentable in their own right. For example, neither reference discloses, teaches, or suggests using the objective measurements recited in claim 39. Neither cited reference discloses, teaches, or suggests any of the empirically derived equations recited in claims 42-48.

Claims 38-48 are also allowable by virtue of their dependency on claim 37. For the above stated reasons, the Applicant respectfully asserts that claims 37-48 are patentable under 35 U.S.C. § 103(a).

Claim 49:

The Examiner also does not provide an independent analysis for claim 49. Claim 49 is directed to a computer readable medium having computer executable instructions for performing a method. The method includes the step of calculating a solution for at least one empirically derived mathematical function by using at least one measured characteristic as an independent variable of the at least one empirically derived mathematical function. As discussed above in relation to the analysis of claim 1 and claim 18, neither cited reference has this step.

The claims depending from claim 49 are also patentable in their own right. For example, neither reference discloses, teaches, or suggests any of the empirically derived equations recited in claims 51-53.

Claims 50-60 are also allowable by virtue of their dependency on claim 49. For the above stated reasons, the Applicant respectfully asserts that claims 49-60 are patentable under 35 U.S.C. § 103(a).

Claim 61:

The Examiner also does not provide an independent analysis for claim 61. Claim 61 is directed to a programmable device for evaluating quality in a telephonic voice connection in a telecommunications network. The Examiner does not point out where in either Hollier or Malvar a programmable device for evaluating quality in a telephonic voice connection is disclosed.

Claim 61 includes a memory operative to store at least one empirically derived mathematical function having at least one independent variable. The Examiner does not point out where in either Hollier or Malvar this element can be found.

Claim 61 includes an interface control circuit adapted to receive revised empirically derived data from an external device, and store the revised empirically derived data in the memory. The Examiner does not point out where in either Hollier or Malvar this element can be found.

Claim 61 includes a processor programmed to calculate a revised empirically derived mathematical function using the revised empirically derived data. The processor calculates a solution to the revised at least one empirically derived mathematical function by using at least one measured characteristic as the independent variable. The solution is an estimate of likely user perception of the quality of the telephonic voice connection. The Examiner does not point out where in either Hollier or Malvar this element can be found either.

For the above stated reasons, the Applicant respectfully asserts that claim 61 is patentable under 35 U.S.C. § 103(a).

B. There is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.

On page 3 of the Examiner's Office Action, the Examiner provides a motivational statement that essentially states that it would be obvious to replace Hollier's codec with the one taught by Malvar "so that the codec may use a simple algorithm controlled by a single parameter to represent the probability density function as taught by Malvar." First of all, the meaning of this statement is unclear. Second, the Examiner fails to point out where his motivational statement can be found, either in the references themselves, or in the knowledge generally available to those of ordinary skill in the art. Third, the proposed modification renders Hollier unsatisfactory for its intended purpose.

According to **MPEP 2143.01**, if a proposed modification renders the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984). In this case, Hollier's invention is directed to a method for evaluating the quality of service in a network. Malvar discloses an improved codec that handles degraded speech, as well as clean speech (Column 2, lines 33-45). Malvar's codec is also robust when it comes to packet losses. It is inconceivable that one skilled in the art would use a codec that masks network problems in a device designed to detect network problems. Rather, one skilled in the art would use a codec that provides an accurate condition of the network-under-test. Thus, there is no motivation or suggestion in these references to make the Examiner's proposed combination.

C. There is no reasonable expectation of success.

The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 231 USPQ 375 (Fed. Cir. 1986). In this case, there is no reasonable expectation for success for the same reason the combination renders Hollier unsatisfactory for its intended purpose. The Examiner's proposed combination would result in a system that employs a codec that masks network problems in a device designed to detect network problems. As a result, the device would provide erroneous estimates of network quality. Thus, there is no reasonable expectation of success.

2. Conclusion

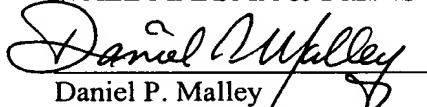
Based upon the above remarks and papers of record, Applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests reconsideration of the pending claims 1-61 and a prompt Notice of Allowance thereon.

Applicant believes that no extension of time is necessary to make this Response timely. Should Applicant be in error, Applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Response timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 50-0289.

Please direct any questions or comments to Daniel P. Malley at (607) 256-7307.

Respectfully submitted,

WALL MARJMA & BILINSKI

A handwritten signature in dark ink, appearing to read "Daniel P. Malley", is written over a horizontal line.

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